

TRENDS IN PRACTICE REPORT



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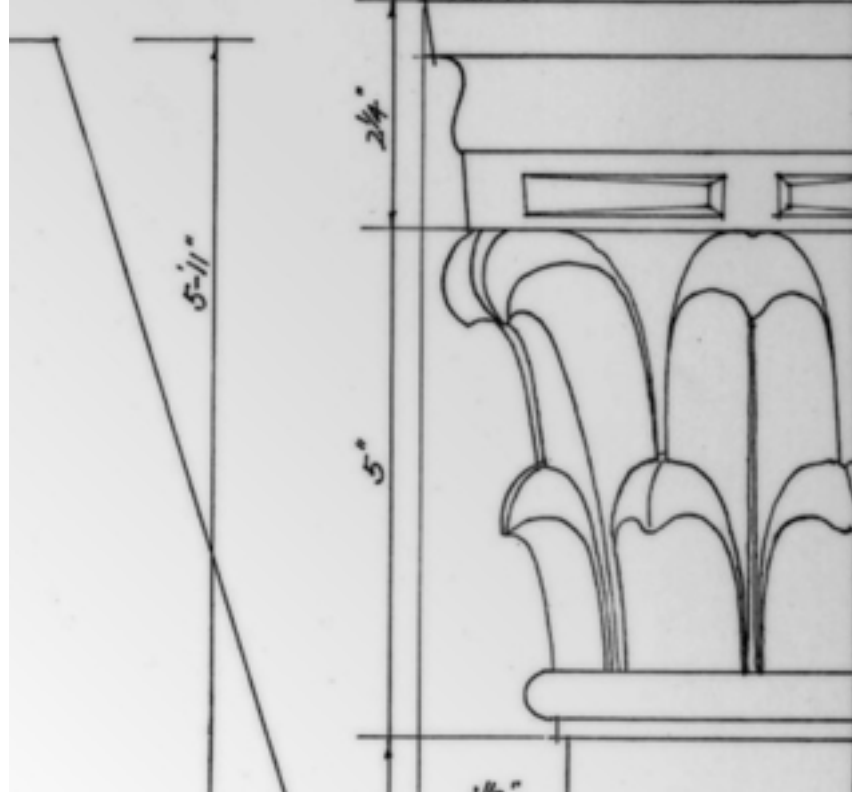
TRENDS IN PRACTICE REPORT

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I N T R O D U C T I O N

BACKGROUND

In January 1997, the California Board of Architectural Examiners (CBAE) contracted with Professional Management and Evaluation Services, Inc. (PMES) to develop a new test plan for the California Supplemental Examination for implementation beginning with the 1999 examination administrations.

This process involved a survey of California licensed architects to develop an accurate description of the current nature and scope of architecture in California by identifying the specific details of actual practice.

There were two steps involved in conducting the job analysis survey:

1. The construction of an inventory of the tasks typically performed by architects when working on projects in the state of California including biographical and practice-related questions.
2. The distribution and retrieval of survey questionnaires from a random sample of California licensed, practicing architects, and the subsequent statistical analysis of data collected from the survey respondents.

The selected sample to receive the job analysis survey comprised 3,450 subjects (21.5% of the survey population of 16,014 California licensed architects residing in California) and was broadly representative of the geographic distribution of architects and weighted equally in terms of newly-licensed and experienced architects. Several analyses were done to ensure that the sample was valid. The results of the analyses indicated no detectable sample bias, thus confirming that the sample was technically valid.

The questions in the “Biographical Information” and “Trends in Practice” sections of the questionnaire were developed to measure the professional background and experience of the respondent, and to measure the respondent’s

recent practice activities, as well as expectations for future practice. The data collected from the questions provided a description of the respondents, the results of which were presented in a technical report to CBAE in 1998.

The collection of these data from a large representative sample of licensed practitioners offered a unique opportunity not only to identify patterns and trends in architectural practice, but also to investigate their relation with the professional and situational characteristics of the California architect. To evaluate this information, CBAE commissioned PMES to conduct a special study.

Because a preliminary analysis revealed an interesting pattern of relationships between various pairs of variables in the Biographical and Trends section, a study design using bivariate methods of analysis was suggested to CBAE and approved. This report presents the results of that study.

For detailed information regarding the survey data and methodologies used, see Attachment 2—Study Design and Methodologies.

USES FOR THIS REPORT

Consistent with most professional business enterprises, the practice of architecture is influenced by external factors that effect change, as well as by the characteristics of the architect and aspects of the services provided. The architectural profession has gone through significant changes in the last few decades that have expanded and added to the complexity of the practice.

The increasing elaboration and expansion of the scope of architectural practice is documented in the differences in entry-level practice as enumerated in the task lists of the 1987 and the 1997 job analyses conducted by CBAE. As noted in CBAE's recently published *The Practice of Architecture in California: A report on the 1998 analysis of architectural practice in California*, the major change, in terms of job content, is "adding relationships with **people** to the technical issues dealing with **things**." This can be seen in the new tasks in the 1997 survey that were not present in the 1987 survey:

- Expanded services: peer review, facilities management, and post occupancy studies and evaluations
- Inter-relationships of societal factors and the built environment (cultural differences, socioeconomic and political factors, and community as a whole)
- Professional development activities (continuing education, American Institute of Architects [AIA] activities, and intern development)
- Model for office organization
- Business management systems to conduct an architectural practice
- Project feasibility analysis

Going beyond the enumeration of tasks of previous job analysis surveys, the 1997 survey gathered additional data on the background and professional experience of responding architects, their current work situation, the types of architectural services they provide, the effects of recent external changes on their practice, and their expectations of changes in the profession in the future. These data were gathered in the Biographical and Trends in Practice sections of the job analysis survey questionnaire, and they are the basis of the results presented in this report.

While it is well beyond the scope of this report to offer a definitive picture of the changes and developments that evolve over time as trends in architectural practice, the

results are suggestive of those trends. They reveal that the recent changes in marketing strategies, stronger client relationships, environmental concerns, advanced electronic office systems, and more specialization in practice appear to be emerging as strong currents in setting future directions. These results suggest how professional architects view their recent experiences in practice and also what they expect in the future, and may, therefore, be useful information for evaluation, planning, education, or public policy.

SUMMARY OF RESULTS

The variables in the job analysis questionnaire were organized, first, in terms of a distinction between the characteristics of the architect and the aspects of the professional services the architect provides. The variables in "Biographical Information" were used to describe the characteristics of the architect, while the variables in "Trends in Practice" were used to portray the kinds of architectural services provided. For the questions and results from these two sections of the survey, see Attachment 1.

To describe the architect, certain variables were selected from the Biographical section and then grouped to measure three elements: *Professional Background*, *Work Situation*, and *Work Context*. To describe the basis and variety of the architectural services provided by the architect, the variables from the Trends in Practice section were grouped to be used as measures of four elements: *Professional Services*, *Technology Usage*, *Professional Development*, and *Trends in Practice*. The Trends in Practice construct was divided into two parts: perceptions of the effects of issues or situations on practice over the last five years and expectations of changes in the profession over the next five years.

Architect and Architectural Practice

The goal of the first part of the statistical analysis was to build a picture of the California architect and of current architectural practice. This was done by a descriptive analysis of the

data from each variable in the Biographical and Trends in Practice sections.

Architect

As a snapshot, the portrait of the statistically-created composite California architect is primarily a male Caucasian with a college education from within California. He has almost 12 years of licensed practice in California and nearly 18 years of work experience in architecture in this state. This architect is likely to work in an architect's office, to be either the principal or the project architect/manager, to work alone or in a small office, and to be the only licensed architect in this office. He is likely to work a normal, full-time work week, have his primary workplace in a metropolitan area, and have the majority of his work projects located within California.

To measure the architect's professional background and situational characteristics, certain variables were selected from the Biographical section and then grouped to measure three combinations.

Professional Background. As a concept, "Professional Background" refers to the education, training, and work experience that is the basis of the practitioner's knowledge, skill, and ability as a professional. This concept was developed by the measures of:

- formal education
- other certifications/state licenses/registrations
- number of years worked as a licensed architect in California

Over 57% of the respondents had at least a professional degree in architecture. The fact that only 24% had a license in another state is probably unique to California. This means that 76% work exclusively in California. Most other architects in the United States work in several states in addition to their home state.

Work Situation. This concept refers to the office environment and associated attendant conditions within which the professional

engages in practice. This concept was constructed by the measures of:

- primary position in the firm
- number of full-time employees in the office
- number of licensed architects in the office
- number of hours worked per week

Regarding primary position, 47% of respondents indicated that they were a principal, which means that about one-half of the architects are in management positions. This is consistent with the large number of smaller firms (32% with 2–10 employees) and 41% with only one licensed architect in the office. This may also be why the work week average sample is 42.5 hours.

Work Context. This concept refers to the broader sociogeopolitical environment within which practice is conducted. This concept was developed by the measures of:

- location of primary workplace
- location of majority of work projects

Regarding location of primary workplace, 64% indicated it was in a metropolitan area while 49% work in only one county, 4% outside California, and 1% outside the U.S.

Architectural Practice

The snapshot of architectural practice that emerges is one in which the architect is likely to:

- work on multi-unit residential homes or small non-residential buildings involving new construction or remodel/renovation.
- use design-bid-build or negotiated bid to deliver the architectural services for this work formalized in contractual agreement in an AIA or in-house form.

The typical architect:

- is knowledgeable of computer-aided design and drafting (CADD).
- uses computer design and drafting technology infrequently.
- uses the Internet mainly for professional communication or for technical information/continuing education.

- is likely to be highly positive in his attitude about the benefits of continuing education, both personally and for the profession, but is unlikely to feel that it should be mandatory for license renewal.
- is unlikely to have heard about the Intern Development Program (IDP) or participated in it during training.

Looking back over the last five years, the typical architect is likely to feel that:

- there was no impact on his practice for most of the conditions investigated.
- exposure to liability increased.
- accessibility compliance services and the variety of architectural services had both increased.

When looking ahead, the typical architect:

- tends to be optimistic, believing that design-build activity will grow.
- sees more opportunity for national and international work.
- believes partnering with architects/offices will increase.
- sees a continued increase in liability exposure.
- expects technology to affect project delivery times.

To describe the basis and variety of the architectural services provided by the architect, the variables from the Trends in Practice section were grouped as measures for five categories:

Professional Services. This concept refers to the variety and means of delivery of professional services the architect provides in his or her practice. At an operational level, this concept was developed by the measures of:

- the office's current architectural services
- use of contract forms

Of the respondents, 50 % provide design-bid-build services and 45% use AIA contract forms. In general, a pattern of primarily weak to modest relationships were found between

the two measures of Professional Services (Office's Services and Use of Contract Forms) and the measures of Professional Background. Somewhat stronger relationships were observed when the measures for Work Situation and Work Context were considered. Thus for Office's Services, the delivery of architectural services by design-bid-build was more likely among rural architects but less likely among those with most of their work in another state. However, the opposite was true for fast track delivery, which was less likely among rural architects and more likely among architects with most of their work in another state.

Technology Usage. This concept refers to the architect's familiarity with and usage of computer-based technical tools for project design/production and communication. Operationally, the concept was developed by the measures of:

- CADD technologies
- Internet usage

A pattern of modest to strong relationships were observed between the two measures of Technology Usage (CADD technology and Internet use) and the measures of the architect's characteristics.

- For CADD technology, both CADD drafting and CADD design use decrease with length of professional experience, but increase with work week length and firm size.
- For Internet usage, lack of use is highest among the lowest educated and the most experienced architects, and decreases as work week length, firm size, and number of licensed architects in the office increases, and also decreases for architects involved with non-local projects.

Of the purposes for which the Internet is used, both professional communication and technical information stood out.

- Usage of both is highest among the more recently licensed.
- Internet usage for professional communication and technical information also in-

creases as work week length and firm size grow, and increases, too, for those involved with non-local projects.

- The use of the Internet for professional communication also increases with educational level and the number of licensed architects in the office.

In 1997, 45% used CADD. That number has increased rapidly over the past few years and the usage will continue to increase. The same holds true for Internet usage, at 48%. This is new technology and will be as pervasive as the telephone in the near future.

Professional Development. This concept refers to the architect's on-going development as a competent, up-to-date professional and his or her involvement in the growth of the profession. Operationally, the concept was constructed by the measures of:

- beliefs about continuing education
- involvement with IDP

A pattern of weak to modest linkage was found between the two measures of Professional Development (beliefs about continuing education and involvement with IDP) and the measures of Professional Background and those of Work Context. Moderate relationships were observed between three of the measures of Work Situation and IDP involvement. Lack of familiarity with IDP is more likely as work week length, firm size, and number of licensed architects in the office decrease. Also, the likelihood of having at least one IDP intern in the office increases with firm size and number of licensees. Finally, involvement as an IDP sponsor increases as work week length increases.

Responses about the benefits of continuing education were uniform and extremely high, ranging from 82–100%. Overall, over two-thirds did not think continuing education should be mandatory; while requiring continuing education was not as popular with small firms as with larger firms.

Responses about IDP show the current problem with implementation of this program

in California, since 43–72% of architects are not familiar with IDP and only 33% or less have sponsored or are willing to sponsor a candidate.

Trends in Practice—Last Five Years. The concept refers to the patterns of developments and changes in architectural practice over the previous five years (1992-1997) and includes the nature and organization of professional services and the socioeconomic environment within which practice occurs.

Overall, the strongest pattern of relationships was observed between the measures of the Trends conditions and the three sets of variables measuring the architect's background and situational characteristics. As observed in the analyses of Professional Services, Technology Usage, and Professional Development, the strongest relationships involved measures of Work Situation, especially, and Work Context.

Of the numerous relationships found, four Trends conditions produced the strongest and most consistent pattern of results.

Two conditions, "networking of offices" and "increase in international practice," involved a *positive* change whereby the likelihood of experiencing this effect on each condition in practice increases with work week length, firm size, and number of licensees, and is more likely for metropolitan practitioners, and for those involved with non-local projects.

Two Trends conditions, "exposure to liability" and "shortened time frames," involved a *negative* change in practice in which the experience of this effect on each condition was found, also, to increase with work week length, firm size, and number of licensees, and to be more likely for architects involved with non-local projects.

The most predictable areas were increases in liability exposure, accessibility compliance, and shortened time frames. There were, however, some significant changes in networking of offices, partnering, international practice, project delivery methods, and increased services performed.

Trends in Practice—Next Five Years. The concept of trends in practice in the short-term future was constructed by the measures of the respondent's expectations of changes in the profession over the next five years (1998-2003).

Of the five Trends conditions investigated, only one, "opportunities for national and international work," produced a pattern of strong results. The number of architects who believed architectural activity would grow increased with educational level, work week length, firm size, and number of licensees, and those involved with projects in other states or countries.

The next five years will see the sophistication and the needs of client and user change, which is reflected in the survey in the following manner:

- Liability exposure will continue to be a factor that influences the way practice is conducted. Some of the more traditional

services that create the greatest amount of exposure may decrease relative to other areas of practice, while other non-litigious services will expand.

- As the variety of services offered increases, national and international opportunities and competition may also increase.
- Project delivery methods will likely continue to move from design-bid-build to other methods, such as design/build, that will respond to decreasing project time frames.
- Technology in regards to project delivery will be an important factor in shortening delivery times.
- Networking between offices as well as partnering with clients and contractors will increase.

We hope the data in this report raise questions and provide you with information you can use as a practitioner, regulator, or educator.

DESCRIPTIVE RESULTS

In this section of the report, three characteristics of the architect were used to cross tabulate an analysis of five aspects of architectural services.

The three architect characteristics were:

- Professional Background
- Work Situation
- Work Context

The five aspects of architectural services were:

- Professional Services
- Technology Usage
- Professional Development

- Trends in Practice—Last Five Years
- Trends in Practice—Next Five Years

The intent of the analysis in this section is to better understand the changes in the measure of the five aspects of architectural services in terms of their association with the measures of the three characteristics of the architect—Professional Background, Work Situation, and Work Context.

CHARACTERISTICS OF THE ARCHITECT

To measure the architect’s professional background and situational characteristics, three variables were selected from the Biographical section of the survey.

PROFESSIONAL BACKGROUND

Professional Background refers to the education, training, and work experience that form the basis of the practitioner’s knowledge, skills, and ability as a professional.

Provided below are the questions architects were asked in the job analysis survey form relating to education and experience and the respondents’ data for these questions.

Question:

What is the highest level of formal education that you have completed?

- High school diploma 3.7%
- Two-year community college degree in field unrelated to architecture 0.4%

- Two-year community college degree in architecture-related field 4.0%
- Four-year degree in field unrelated to architecture 1.2%
- Four-year degree in architecture-related field 4.2%
- Four-year degree in architecture 17.6%
- Non-accredited professional degree in architecture 2.1%
- Accredited professional degree in architecture 35.3%
- Advanced degree in architecture (Master’s or Ph.D.) 22.5%
- Advanced degree other than architecture 3.3%
- Other formal education 5.7%

Question:

With respect to your architectural work experience, how many years have you worked as a licensed architect in California?

Average 11.8 years

Question:

What other certifications, state licenses, or registrations do you hold?

None	57.6%
Architect (state other than California) . .	23.9%
Contractor	9.2%
Other	8.8%
Civil Engineer (PE)	2.1%
Remaining choices—attorney, building official, construction management, facilities manager, interior designer, landscape architect, professional land surveyor, real estate broker, structural engineer	0-1.3% each

In terms of the highest level of **formal education** completed, while 8% had less than a four-year college education, 23% had completed a four-year college degree, 37% had a professional degree in architecture, and 26% held an advanced degree (Master's or Ph.D.). A majority (61%) of the respondents had completed their formal education in California. But just over one-third (35%) had been educated in another state. The rest (8%) had completed their studies outside the U.S.

As a group, the respondents averaged 11.8 **years of work as a licensed architect in California**. However, almost half (46.5%) had less than eight years of licensed practice and few (11.3%) had practiced with a license for twenty-five years or more. In relation to working in the profession of architecture in California, the sample averaged 17.5 years, and averaged 2.5 years of practice primarily in another state or country.

Of the respondents, 42% held some **other professional certification / license / registration**. Nearly a quarter (24%) were licensed to practice as an architect in another state, and just under one-in-ten (9%) reported being licensed as a contractor. With the exception of

the "Other" category (8%), all of the other options listed were checked by no more than 2% of the respondents.

Work Situation

Work Situation refers to the office environment and associated attendant conditions within which the profession engages in practice.

Provided below are the questions architects were asked in the job analysis survey form relating to primary position in firm, number of hours worked per week, number of full-time employees, and number of licensed architects in office and the respondents' data for these questions.

Question:

*What is your **primary** position in your firm?*

Designer	3.0%
Job captain	3.0%
Principal	46.8%
Project architect/manager	36.8%
Other	10.3%

Question:

Over the last five years, how many hours per week, on average, do you work in the profession of architecture? (If you have been licensed less than five years, use the period that you have been licensed.)

Average 42.3 hours

Question:

Choose the category that best describes the number of full-time employees in your practice. (Include all staff members.)

1 employee (sole practitioner)	32.2%
2-10 employees	35.1%
11-25 employees	13.2%
26-50 employees	6.8%
More than 50 employees	12.8%

Question:

At the office location where you perform the majority of your work, how many employees (including yourself) are licensed architects?

1	40.8%
2	12.9%
3-5	19.8%
6-10	10.6%
11-20	7.9%
21-50	5.9%
51-150	1.8%

When asked about the **primary position** they occupy in their office, most respondents answered Principal (47%) or Project Architect/Manager (37%). The remainder answered Designer (3%) or Job Captain (3%), or checked the “Other” category (10%). Most respondents worked alone (32%) or in small offices with 2-10 **full-time employees** (35%). However, a notable number (13%) worked in large firms with 50 or more full-time employees.

While the mean for the whole sample was 7.2 licensed architects (including the respondent), just over 40% said that they were the only **licensed architect in their office**.

Finally, in terms of their present work situation, all respondents report that they are currently employed (a requirement for inclusion in the usable survey sample), and most have worked a normal full-time week over the past five years (average for the whole sample is 42.3 **hours worked per week**). Only 8% work 20 or fewer hours per week, and only 11% work more than 50 hours per week.

Work Context

Work Context refers to the broader sociogeopolitical environment within which practice is conducted.

Provided below are the questions architects were asked in the job analysis survey form relating to workplace location and project location.

Question:

Which of the following best describe the location of your primary workplace (office)?

Metropolitan (more than 100,000 people)	64.2%
Urban (20,000–100,000 people)	28.0%
Rural (less than 20,000 people)	7.8%

Question:

Where are the majority of your projects located? Select only one response.

One single California county	49.4%
Most selected counties—Los Angeles, San Diego, San Francisco, Orange, Santa Clara, Alameda, Riverside, Sacramento	
Multiple California counties	45.1%
Outside of California	4.3%
Outside of the United States	1.3%

While most respondents (64%) reported that the **location of their primary workplace** was in a metropolitan area (over 100,000 people), more than one-quarter (28%) reported an urban location (20,000–100,000 people). Fewer than one-in-ten (8%) had an office in a rural location. And in terms of which California county this workplace was located in, Los Angeles had the highest frequency (19%), followed by San Francisco and Orange (both 10%). Next came San Diego (7%), Alameda (6%), Sacramento (5%), Santa Clara (5%), and Contra Costa (4%). Each of the remaining counties was checked by fewer than 3% of the respondents.

When asked about the **location of the majority of their (work) projects**, just under half (49%) checked “one single California county,” while almost as many (45%) checked “multiple California counties.” “Outside of California” was checked by 4%, and 1% checked “Outside of the United States.” Of those selecting a single county, approximately 26% checked Los Angeles, 10% checked San Diego, 7% checked San Francisco, and 6% each checked Santa Clara and Orange Counties. The frequencies across all of the remaining counties were, with one exception (Alameda, 4%), no higher than 3%.

PROFESSIONAL SERVICES

For this report, Professional Services are measured by two different aspects of architectural practice:

- delivery method for architectural services
- type of contract form used for contracting services

Provided below are these questions architects were asked in the job analysis survey form relating to the office’s current use of delivery methods for architectural services and use of contract forms and the respondents’ data for these questions.

Question:

Indicate the category that corresponds to the approximate percentage of your office’s architectural services that are currently delivered using each of the following methods of project delivery. (Given the range of the percentage categories, your responses may not equal 100%.)

Architectural Services	0-25%	26-50%	51% +
Design-Bid-Build	39.9%	15.5%	44.6%
Design/Build	72.2	13.4	14.4
Fast-track	82.0	10.5	7.3
Negotiated Bid	56.3	22.0	21.7
Project and Construction Management	67.2	13.4	19.4

Question:

Which of the following contract forms do you use most frequently for contracting services? Select only one.

AIA forms	44.9%
Client-prepared forms	8.1%
Government forms	7.5%
In-house forms	37.4%
Other	2.0%

With respect to their office’s current architectural services, 45% indicated that more than 50% of services were delivered by design-bid-build, while 40% checked either zero

percent or 1-25%. For design/build, most (72%) said their office either did not use this service delivery method or checked the 1–25% category. Even fewer used fast-track, with most respondents (82%) checking zero percent or 1–25%. However, negotiated bid is used by more offices in that over one-third (36%) checked either the 26–50% or the 51–75% categories. And while a majority of offices (67%) do little or nothing with project and construction management services, one-third report their offices provide at least 26% of their architectural services in this way.

The data in Table 1 show use of negotiated bid to be more common among less educated practitioners, as well as practitioners with more years of professional experience. The most commonly used method across all categories is design-bid-build, and the least common is fast-track.

The data in Table 2 show there is evidence of a relationship between primary position in firm and the use of architectural services. There is a notable difference between project architect and principal on negotiated bid (35% versus 48%, respectively) and project/construction management (38% versus 24 %, respectively). For the three other categories of architectural services, the differences between position are small.

Modest relationships are apparent between the measures of architectural services and the number of full-time employees. For three of the service delivery types, a positive relationship is evident in that use of the method of delivery increases as firm size increases. Fast-track usage shows the greatest increase. This is followed by project and construction manage-

ment and design-bid-build. For negotiated bid and design/build, there is evidence of a negative relationship to firm size.

The last measure of Work Situation is the number of licensed architects in the office. Here, there is a pattern of modest relationships with the measures of architectural services, which parallels the results for the number of full-time employees. Thus, for the same three delivery types, service use increases as the number of licensed architects increases. Again, fast-track usage shows the greatest difference, increasing with the number of licensed architects. Project and construction management and design-bid-build usage both increase as the number of licensees grows. And while the negative relationship to the number of licensed architects for negotiated bid remains about the same as it was for the number of full-time employees, the relationship is more negative for design/build.

This table shows a stronger pattern of association between Work Situation and Professional Services than between Professional Background and Professional Services (Table 1).

In Table 3, when reviewing delivery of services by workplace location, it shows that both urban and metropolitan practices are substantially more likely to use a fast-track delivery method. Rural workplaces are most likely to use design-bid-build.

- When looking at project location, three response areas stand out:
- (1) design/build is used substantially less and negotiated bids are used substantially more outside the United States;
 - (2) fast-track delivery methods are more likely to be used on work outside of California; and
 - (3) management services are more likely to be performed outside of California.

IN TABLE 1, Professional Services results are analyzed by Professional Background, which is measured by two variables:

- level of education
- number of years of professional experience in the practice of architecture in California

PROFESSIONAL SERVICES BY PROFESSIONAL BACKGROUND

Table 1

	ARCHITECTURAL SERVICES				
	Design -Bid- Build	Design/Build	Fast-track	Negotiated Bid	Project & Construction Management
	26% +	26% +	26% +	26% +	26% +
EDUCATION					
Less than 4-year degree	54%	26%	21%	52%	30%
4-year degree	58	35	16	48	34
Professional degree	62	28	14	41	29
Advanced degree	63	24	23	40	39
# YEARS WORKED AS CA LICENSED ARCHITECT					
0–7 years	60%	30%	17%	42%	34%
8–20 years	63	28	17	42	33
Over 20 years	56	20	23	52	31

PROFESSIONAL SERVICES BY WORK SITUATION

Table 2

ARCHITECTURAL SERVICES					
	Design -Bid- Build	Design/Build	Fast-track	Negotiated Bid	Project & Construction Management
	26% +	26% +	26% +	26% +	26% +
PRIMARY POSITION IN FIRM					
Designer	57%	13%	27%	63%	48%
Job Captain	64	40	27	50	33
Principal	57	29	17	48	24
Project Architect	63	27	19	35	38
# FULL-TIME EMPLOYEES					
1 Employee	53%	32%	11%	49%	28%
2-10 Employees	63	28	17	45	30
Over 10 Employees	63	23	26	36	40
# LICENSED ARCHITECTS IN OFFICE					
1 Licensed Architect	53%	34%	14%	48%	28%
2-5 Licensed Architects	67	24	16	39	31
6-10 Licensed Architects	57	18	22	47	29
Over 10 Licensed Architects	68	22	31	36	43

IN TABLE 2, Professional Services are analyzed by Work Situation, which is measured by three variables:

- primary position in firm
- number of full-time employees in office
- number of licensed architects in office

PROFESSIONAL SERVICES BY WORK CONTEXT

Table 3

ARCHITECTURAL SERVICES					
	Design -Bid- Build	Design/Build	Fast-track	Negotiated Bid	Project & Construction Management
	26% +	26% +	26% +	26% +	26% +
LOCATION PRIMARY WORKPLACE					
Metropolitan	62%	26%	21%	42%	34%
Urban	53	30	14	46	31
Rural	73	34	5	48	26
LOCATION MAJORITY OF PROJECTS					
1 CA County	59%	30%	15%	43%	31%
Multiple CA Counties	63	26	18	44	32
Outside California	43	35	44	41	44
Outside United States	67	17	36	55	36

IN TABLE 3, Professional Services are reported by Work Context, which is measured by two variables:

- location of the architects' primary workplace
- location of the majority of projects

TECHNOLOGY USAGE

For this report, Technology Usage is measured by two computer applications:

- use of computer-assisted design and development (CADD)
- use of the Internet

Provided below are the questions architects were asked in the job analysis survey form relating to the architect's use of computers and the Internet and the respondents' data for these questions.

Question:

Indicate your use of the following computer technologies.

Computer Technology	Do Not Have Knowledge of This Technology	Have Knowledge of the Capability But Do Not Use It	Have the Capability But Use it Infrequently	Use it on a Frequent Basis
CADD Drafting	8.7%	29.4%	16.6%	45.3%
CADD Design & Drafting	11.4%	30.9%	21.9%	35.8%
3D Computer Modeling & Animation	33.6%	40.3%	19.2%	6.8%

Question:

For what purposes do you use the Internet? Mark all that apply.

Do not use the Internet	35.2%
Employment opportunities/ personnel resources	17.0%
Marketing	14.2%
Professional communication including exchange of documents	47.9%
Technical information/ continuing education	43.4%
Other	9.5%

The job analysis survey gathered data about the **use of computer technologies** in relation to three levels of computer applications. The most basic was CADD drafting for which only 9% reported having no knowledge of this technology. While 29% say they have the know-how but do not use it, nearly half (45%) report that

they use this technology on a frequent basis. A similar pattern is evident for CADD design and drafting with 89% indicating knowledge of this technology. Of these respondents, as many as 58% report that they use this technology infrequently (22%) or frequently (36%). A more restricted pattern of knowledge and capability is evident for the newer technology of 3-D modeling, however. On this technology, as many as one-third (34%) report having no knowledge. And while the rest (66%) say they have the know-how, only just over one-quarter (26%) say they use it infrequently (19%) or frequently (7%).

On Internet usage (respondents were instructed to mark all that apply), it is noteworthy that more than one-third (35%) said they did not use this technology. However, almost half (48%) checked that they use it for professional communication (which included the exchange of documents), and just over forty

TECHNOLOGY USAGE BY PROFESSIONAL BACKGROUND

Table 4

	CADD (FREQUENT OR INFREQUENT USE)			INTERNET				
	Drafting	Design & Drafting	3D	Don't Use	Employment	Marketing	Prof. Com.	Technical Info/CE
EDUCATION								
Less than 4-yr degree	58%	57%	29%	48%	11%	10%	35%	42%
4-year degree	64	58	25	37	19	15	45	45
Professional degree	66	62	29	33	14	16	52	46
Advanced degree	60	56	24	28	25	15	54	45
# YEARS WORKED AS CA LICENSED ARCHITECT								
0 –7 years	74%	69%	31%	26%	21%	16%	57%	49%
8–20 years	58	53	24	35	18	14	45	44
Over 20 years	38	37	17	59	6	9	27	28

IN TABLE 4,

Technology Usage is reported by Professional Background, which is measured by two variables:

- level of education
- number of years of professional experience in the practice of architecture in California

percent (43%) said they used it for technical information / continuing education. Fewer than twenty percent said they use the Internet for employment opportunities / personnel resources (17%), marketing (14%), or for other purposes (10%).

It should be remembered that these data were collected in the fall of 1997, and, since the technology revolution is accelerating, the figures have probably increased significantly in most cases.

The data in Table 4 indicate, not surprisingly, that those architects with more professional experience (more than 20 years) in the field are less likely to use CADD or the Internet, while those with the least professional experience (0-7 years) use both CADD and the Internet more.

Although level of education shows some relationship to use of CADD drafting (increasing from a lower level of education through a professional degree), there appears to be no such relationship with CADD design and drafting or 3D modeling.

Somewhat surprising is the level of use of

3D modeling by even those with the least professional experience. Moreover, advances in computer technology that have occurred since this survey was conducted in 1997 might yield different results if conducted today.

In Table 5, starting with the first indicator of Work Situation, primary position in firm, it is noteworthy that principals are lowest in their usage of CADD drafting and CADD design & drafting of the four firm positions analyzed. This is to be expected given their responsibilities for securing projects, dealing with clients, and firm management. It is also consistent that job captains would report the highest usage of these two CADD technologies. In addition, as expected, of the four positions, designers report the highest usage of 3D modeling.

On Internet usage, more principals say that they do not use this technology than those in each of the other positions.

A stronger, more consistent pattern of results is apparent for hours worked per week, where there is a strong positive relationship for Technology Usage. The architect that works

IN TABLE 5,

Technology Usage is reported by Work Situation, which is measured by four variables:

- primary position in firm
- number of hours worked per week
- number of full-time employees in office
- number of California licensed architects in office

TECHNOLOGY USAGE BY WORK SITUATION

Table 5

	CADD (FREQUENT OR INFREQUENT USE)			INTERNET				
	Drafting	Design & Drafting	3D	Don't Use	Employment	Marketing	Prof. Com.	Technical Info/CE
PRIMARY POSITION IN FIRM								
Designer	72%	69%	38%	30%	10%	17%	57%	43%
Job Captain	87	73	27	30	10	10	53	33
Principal	58	54	29	41	13	17	44	41
Project Architect	72	66	25	28	23	12	55	49
# HOURS WORKED PER WEEK								
1–19 Hours	33%	34%	12%	50%	11%	4%	30%	35%
20–39 Hours	49	45	21	55	15	6	28	31
40–49 Hours	66	61	25	32	16	14	51	44
Over 49 Hours	67	62	32	29	20	21	54	50
# FULL-TIME EMPLOYEES								
1 Employee	49%	45%	22%	53%	12%	10%	29%	35%
2–10 Employees	72	66	30	34	14	15	51	44
Over 10 Employees	65	61	26	19	25	18	63	51
# CA LICENSED ARCHITECTS IN OFFICE								
1 Licensed Architect	57%	55%	27%	44%	14%	14%	36%	41%
2–5 Licensed Architects	67	61	24	33	20	13	53	44
6–10 Licensed Architects	70	63	29	21	20	21	64	51
Over 10 Licensed Architects	61	61	26	19	21	17	65	50

TECHNOLOGY USAGE BY WORK CONTEXT

Table 6

	CADD (FREQUENT OR INFREQUENT USE)			INTERNET				
	Drafting	Design & Drafting	3D	Don't Use	Employment	Marketing	Prof. Com.	Technical Info/CE
LOCATION OF PRIMARY WORKPLACE								
Metropolitan	62%	58%	27%	32%	19%	15%	52%	44%
Urban	63	59	27	40	14	13	41	41
Rural	56	51	22	41	15	13	39	45
LOCATION OF MAJORITY OF PROJECTS								
1 CA County	56%	52%	24%	41%	15%	11%	41%	40%
Multiple CA Counties	68	64	28	31	19	17	54	45
Outside California	60	62	26	12	26	23	72	58
Outside United States	58	69	31	8	8	31	85	62

IN TABLE 6,

Technology Usage is reported by Work Context, which is measured by two variables:

- location of primary work-place
- location of majority of projects

the most hours per week utilizes CADD and the Internet the most.

For CADD technology and the number of full-time employees, the firms with 2–10 employees have a significantly greater tendency to use CADD than single-employee firms, and moderately more than those with more than 10 employees.

On Internet usage, there is evidence of an even stronger relationship with the number of full-time employees. Internet access is utilized more by the large firms. The rate of non-use of the Internet for single-licensee offices more than doubles that of offices with more than 10 licensed architects.

Turning to the relationship between the number of licensed architects in the office and CADD technology, there is a moderate difference in CADD drafting between single-licensee offices and those with 6–10 licensed architects.

The architect that is closest to project production (the job captain) and the architect that works the longest hours are more apt to use technology than those of the other categories.

The firms with 2–10 employees and those with 2–10 California licensed architects on staff are the highest users of CADD; while the larger firms of more than 10 employees and those with more than 10 licensed architects on staff are greater users of the Internet.

In Table 6, architects in larger cities and those who do work in broader geographical markets have a tendency to use computer technologies more than those in more rural areas and in narrow geographic markets.

However, the differences in CADD usage are quite small. The differences in Internet use are more dramatic.

PROFESSIONAL DEVELOPMENT

For this report, Professional Development is measured by two aspects of architects' knowledge and opinions:

- continuing education
- IDP

Provided below are the questions architects were asked in the job analysis survey form relating to the architect's beliefs about continuing education and involvement in IDP and the respondents' data for these questions.

Question:

With respect to continuing education, do you believe:

- a. *Participation enhances your skills as an architect*
Yes 85.9%
No 14.1%
- b. *Participation improves the public's perception of architects' competence*
Yes 59.4%
No 40.6%
- c. *Participation should be required as a condition for license renewal*
Yes 31.6%
No 68.4%

Question:

Select the statements below that describe your involvement with the Intern Development Program (IDP). Mark all that apply.

- I am not familiar with IDP. 58.3%
- I completed IDP during my architect training. 5.6%
- There is at least one intern in my office currently participating in IDP. 9.5%
- I have sponsored or am willing to sponsor an intern's participation in IDP as a mentor or employer. 25.1%

In terms of their attitude toward continuing education, almost all respondents (86%) believe

that participation enhances their skills as an architect. And while a majority (59%) believe that continuing education improves the public's perception of architects' competence, less than one-third (32%) felt that it should be required as a condition for license renewal.

A striking feature in the next three tables is the extremely high belief (over 80%) across all categories that continuing education enhances architectural skills. In addition, 55%-72% believe that continuing education improves the public perception of an architect's competence.

The second aspect of Professional Development investigated in the survey was involvement with the Intern Development Program (respondents were instructed to mark all answers that apply). Perhaps the most noteworthy result is that nearly 60% of the sample said that they were not familiar with IDP. In terms of their own involvement, only 6% indicated that they had completed IDP during their architect training. Ten percent reported having one or more IDP interns currently in their office. However, despite this lack of awareness or present involvement with IDP, as many as one-quarter said that they either had sponsored or were willing to sponsor an intern's participation in IDP as a mentor employer.

In Table 7, when measured against education and number of years worked, there is minimal difference in the relationship between them and the respondents' attitudes toward continuing education. There are some modest relationships evident between experience and education and familiarity with IDP.

PROFESSIONAL DEVELOPMENT BY PROFESSIONAL BACKGROUND

Table 7

	CONTINUING EDUCATION			IDP			
	Enhances Skills	Improves Public Perception	Should be Required	Not Familiar	Completed During Training	At Least 1 Intern in Office	Have/Willing to Sponsor
EDUCATION							
Less than 4-yr degree	82%	61%	29%	65%	6%	6%	19%
4-year degree	88	62	32	63	4	8	26
Professional degree	85	58	31	57	6	10	26
Advanced degree	87	59	36	55	6	12	27
# YEARS WORKED AS CA LICENSED ARCHITECT							
0 –7 years	88%	60%	34%	54%	6%	13%	28%
8–20 years	85	58	30	63	6	7	23
Over 20 years	84	63	30	62	4	5	23

IN TABLE 7, Professional Development is reported by Professional Background, which is measured by two variables:

- level of education
- number of years of professional experience in the practice of architecture in California

PROFESSIONAL DEVELOPMENT BY WORK SITUATION

Table 8

	CONTINUING EDUCATION			IDP			
	Enhances Skills	Improves Public Perception	Should be Required	Not Familiar	Completed During Training	At Least 1 Intern in Office	Have/Willing to Sponsor
PRIMARY POSITION IN FIRM							
Designer	90%	72%	28%	50%	3%	23%	33%
Job Captain	93	60	10	60	7	13	17
Principal	84	58	29	59	6	5	28
Project Architect	89	60	35	57	4	16	25
# FULL-TIME EMPLOYEES							
1 Employee	85%	55%	29%	72%	6%	1%	14%
2–10 Employees	86	61	29	58	7	6	31
Over 10 Employees	87	63	37	46	4	22	31
# CA LICENSED ARCHITECTS IN OFFICE							
1 Licensed Architect	84%	57%	29%	67%	6%	3%	20%
2–5 Licensed Architects	87	61	31	56	5	9	30
6–10 Licensed Architects	89	60	38	50	6	16	30
Over 10 Licensed Architects	84	58	36	43	5	27	28

IN TABLE 8, Professional Development is reported by Work Situation, which is measured by three variables:

- primary position
- number of full-time employees in office
- number of licensed architects in office

IN TABLE 9, Professional Development is reported by Work Context, which is measured by two variables:

- location of primary workplace
- location of majority of projects

PROFESSIONAL DEVELOPMENT BY WORK CONTEXT

Table 9

	CONTINUING EDUCATION			IDP			
	Enhances Skills	Improves Public Perception	Should be Required	Not Familiar	Completed During Training	At Least 1 Intern in Office	Have/Willing to Sponsor
LOCATION OF PRIMARY WORKPLACE							
Metropolitan	87%	60%	34%	54%	5%	13%	28%
Urban	84	57	29	65	6	5	20
Rural	86	61	23	71	9	0	19
LOCATION OF MAJORITY OF PROJECTS							
1 CA County	85%	61%	31%	60%	6%	7%	26%
Multiple CA Counties	87	57	33	58	5	12	24
Outside California	86	67	38	44	12	21	33
Outside United States	100	69	15	46	0	23	31

In Table 8, attitudes toward continuing education remain constant and positive. There is some evidence that beliefs about continuing education vary, to some degree, by the position the respondent occupies, but other differences are minor.

There are more differences in familiarity with IDP. The bigger the firm, the more likely its respondent is familiar with IDP. Another obvious correlation is between familiarity with IDP and whether an IDP intern was in the office.

In Table 9, there is little difference in attitude toward continuing education among the various categories.

For IDP involvement, two indicators show a moderate relationship with workplace location. There is an increased likelihood of being not familiar with IDP for respondents in a rural setting versus those in a metropolitan area. For the presence of an IDP intern in the office, there is a substantial difference—13% of those in a metropolitan location report having at least one intern in their office, whereas none of those in rural areas do so. A similar pattern holds for IDP sponsorship, although the differences are smaller in magnitude.

TRENDS IN PRACTICE—LAST FIVE YEARS

This concept refers to the patterns of developments and changes in architectural practice over the previous five years (1992-1997) and includes the nature and organization of professional services and the socioeconomic environment within which practice occurs.

Shown below is the survey question relating to the effect of issues or situations on the architect's practice over the last five years and the respondents' data for this question. Fourteen specific issues or situations were identified and respondents were asked to indicate whether each of these conditions had had a "Negative Change," "No Change," or "Positive Change" on their practice over the last five years.

For ten of the fourteen conditions investigated, a majority of the respondents checked "No Change" (change in client database, 69%; change in entertainment industry opportunities, 82%; change in high tech industry opportunities, 61%; change in medical industry opportunities, 74%; competition from non-architects, 52%; entry-level opportunities, 76%; increase in international practice, 79%; military base closures, 78%; networking of

Question:

*Indicate the kind of effect the following have had on your practice **over the last 5 years.***

Issues or Situations	Negative Change	No Change	Positive Change
a. Accessibility Compliance Services	19.9%	37.1%	43.0%
b. Change in Client Base (Owner/Occupant vs. Speculative Developer)	8.0	69.1	22.9
c. Change in Entertainment Industry Opportunities	1.9	81.6	16.5
d. Change in High Tech Industry Opportunities	1.7	60.8	37.6
e. Change in Medical Industry Opportunities	6.1	74.1	19.8
f. Competition From Non-Architects	45.0	51.9	3.1
g. Entry-Level Opportunities	12.3	75.7	11.9
h. Exposure to Liability	53.3	41.5	5.2
i. Increase in International Practice	2.5	79.3	18.3
j. Military Base Closures	11.7	78.4	9.9
k. Networking of Offices	1.7	54.8	43.6
l. Post-Disaster Recovery Efforts	2.2	73.8	24.0
m. Shortened Time Frames Caused by Technology and Economy	39.3	35.6	25.1
n. Variety of Services Offered	3.7	47.4	49.0

**TABLE 10-A AND
TABLE 10-B**

report the analysis between past Trends in Practice measures and Professional Background, which is measured by:

- level of education
- number of years of professional experience in the practice of architecture in California

TRENDS IN PRACTICE—LAST 5 YEARS BY PROFESSIONAL BACKGROUND—POSITIVE CHANGE

Table 10-A

	Access Compliance	HighTech Industry	Entry- Level Opp.	Internat'l Practice	Networking of Offices	Variety of Services
EDUCATION						
Less than 4-yr degree	36%	36%	4%	7%	36%	35%
4-year degree	46	41	12	14	42	50
Professional degree	41	35	15	17	48	51
Advanced degree	46	42	12	30	46	53
# YEARS WORKED AS CA LICENSED ARCHITECT						
0–7 years	39%	38%	14%	21%	52%	53%
8–20 years	48	40	11	17	41	48
Over 20 years	43	32	6	12	26	41

NEGATIVE CHANGE

Table 10-B

	Non-Architect Competition	Liability Exposure	Shortened Time Frames
EDUCATION			
Less than 4-yr degree	47%	51%	30%
4-year degree	44	52	39
Professional degree	46	57	42
Advanced degree	45	53	39
# YEARS WORKED AS CA LICENSED ARCHITECT			
0–7 years	45%	56%	44%
8–20 years	48	55	38
Over 20 years	41	44	28

offices, 55%; and post-disaster recovery efforts, 74%).

Of the four other conditions listed, most checked “Positive Change” for accessibility compliance services (43%) and variety of services offered (49%), and most checked “Negative Change” for exposure to liability (53%) and shortened time frames caused by technology and economy (39%).

However, if the category of “No Change” is held aside, the general pattern was optimistic, in that for nine of the fourteen conditions, respondents favored positive change over negative change (accessibility compliance services, 43% vs. 20%; change in client data-

base, 23% vs. 8%; change in entertainment industry opportunities, 17% vs. 2%; change in high tech industry opportunities, 38% vs. 2%; change in medical industry opportunities, 20% vs. 6%; increase in international practice, 18% vs. 3%; networking of offices, 44% vs. 2%; post-disaster recovery efforts, 24% vs. 2%; and variety of services offered, 49% vs. 4%).

When analyzing the Trends in Practice against the three variable characteristics of the architect, tables were created summarizing those identified as positive changes and those identified as negative changes.

In the following set of tables, those positive and negative changes are measured against:

- Professional Background
- Work Situation
- Work Context

In Tables 10-A and 10-B, while most of the fourteen issues or situations show little relationship with the three measures of Professional Background, there are some for which a strong relationship exists.

There is a strong relationship between level of education and the view that an increase in international opportunities, networking of offices, and variety of services offered represent a positive change.

The other pattern that emerges is that those with less professional experience are much

more likely to view increase in international opportunities, networking of offices, and variety of services offered as positive changes than those with more (over 20 years) professional experience. Also interesting is that those with less professional experience feel more negative about shortened time frames caused by technology and the economy.

In Tables 11-A and 11-B, overall, a stronger pattern of relationships is present than was observed for the measures of Professional Background.

Starting with primary position in firm, the largest differences are observed for increase in international practice, variety of services offered, and exposure to liability. On increase in international practice, job captains appear to be much more positive than principals. Job captains were

TRENDS IN PRACTICE—LAST 5 YEARS BY WORK SITUATION—POSITIVE CHANGE

Table 11-A

	Access Compliance	High Tech Industry	Entry- Level Opp.	Internat'l Practice	Networking of Offices	Variety of Services
PRIMARY POSITION IN FIRM						
Designer	31%	35%	11%	28%	48%	35%
Job Captain	43	43	20	40	57	60
Principal	38	32	8	13	36	52
Project Architect	39	44	17	23	55	50
# HOURS WORKED PER WEEK						
1–19 Hours	37%	41%	7%	12%	17%	32%
20–39 Hours	35	26	5	9	27	40
40–49 Hours	47	42	14	20	48	49
Over 49 Hours	41	35	13	19	47	57
# FULL-TIME EMPLOYEES						
1 Employee	36%	27%	6%	7%	27%	43%
2–10 Employees	43	39	12	12	39	51
Over 10 Employees	49	46	17	36	65	52
# CA LICENSED ARCHITECTS						
1 CA Licensed Architect	38%	32%	8%	9%	31%	47%
2–5 CA Licensed Architects	47	39	14	16	48	48
6–10 CA Licensed Architects	43	37	13	20	55	44
Over 10 CA Licensed Architects	53	51	20	48	66	60

TABLE 11-A AND TABLE 11-B report the analysis between past Trends in Practice and the four measures of Work Situation.

NEGATIVE CHANGE

Table 11-B

	Non-Architect Competition	Liability Exposure	Shortened Time Frames
PRIMARY POSITION IN FIRM			
Designer	36%	48%	55%
Job Captain	40	73	47
Principal	50	54	35
Project Architect	42	52	44
# HOURS WORKED PER WEEK			
1–19 Hours	35%	41%	21%
20–39 Hours	51	50	26
40–49 Hours	42	51	42
Over 49 Hours	48	61	44
# FULL-TIME EMPLOYEES			
1 Employee	47%	49%	28%
2–10 Employees	49	53	39
Over 10 Employees	39	57	51
# CA LICENSED ARCHITECTS			
1 CA Licensed Architect	50%	50%	25%
2–5 CA Licensed Architects	46	52	39
6–10 CA Licensed Architects	36	56	55
Over 10 CA Licensed Architects	36	64	59

also more likely to see positive effects than designers on variety of services. However, on exposure to liability, job captains were much more likely to perceive a negative change.

With regard to networking of offices, the principals are less likely to be positive than those in the other positions. This tendency of principals to be less positive than the other positions is also observed on the high tech industry and entry-level opportunities.

Regarding the measures that were perceived to have had a negative effect on practice,

principals are more likely than the other positions to report a negative change for competition from non-architects. On the other measure, shortened time frames, it is the principals who have the lowest response of negative change.

For hours worked per week, there is evidence of some strong relationships with a number of the Trends measures. For the measures involving positive change, there is a consistent pattern of a positive relationship to work week length with the positive perception

increasing as the number of hours worked per week increase.

Regarding the number of full-time employees, the pattern of relationships observed above for both position in firm and work week length continues. The strongest relationships, again, are with networking of offices and shortened time frames with the numbers increasing as the number of full-time employees increase.

Of the other conditions that involve perception of a positive change, increase in international practice is also strongly related to the number of full-time employees. The likelihood of seeing opportunities in the high tech industry tends to increase as firm size becomes larger. So, too, does the perception of positive changes in entry-level opportunities.

Finally, the relationship between the number of California licensed architects in the office and the Trends measures, the pattern of results observed tends to parallel those just reported for the number of full-time employees. This continues a pattern found above for the measures of Professional Services, Technology Usage, and Professional Development.

Again, the strongest associations are with networking of offices and shortened time

frames, and now, too, for increase in international practice.

There is an increase in perceiving entry-level opportunities across the number of licensee categories; and both high tech industry opportunities and accessibility compliance services evidence notable differences, too.

Regarding two measures involving negative change—exposure to liability and competition from non-architects—while the former condition shows an increased likelihood of a negative perception as the number of licensees increases, this negative perception decreases for competition as the number of licensees increases.

In Table 12-A and 12-B, when the past Trends in Practice measures are broken down by the first measure of Work Context—location of primary workplace—the strongest relationships, in terms of magnitude of difference, are observed for two conditions—competition from non-architects and networking of offices. Not only are those in rural areas more likely than their more urbanized colleagues to be negatively affected by competition from non-architects,

TRENDS IN PRACTICE—LAST 5 YEARS BY WORK CONTEXT—POSITIVE CHANGE

Table 12-A

	Access Compliance	High Tech Industry	Entry- Level Opp.	Internat'l Practice	Networking of Offices	Variety of Services
LOCATION OF PRIMARY WORKPLACE						
Metropolitan	46%	41%	14%	23%	47%	51%
Urban	40	34	10	12	40	46
Rural	34	25	3	7	26	49
LOCATION OF MAJORITY OF PROJECTS						
1 CA County	44%	34%	11%	12%	37%	48%
Multiple CA Counties	43	40	12	19	48	49
Outside California	42	52	21	55	79	66
Outside United States	31	54	31	85	54	54

TABLE 12-A AND TABLE 12-B contain the results of the analysis between the past Trends in Practice and the two measures of Work Context.

NEGATIVE CHANGE

Table 12-B

	Non-Architect Competition	Liability Exposure	Shortened Time Frames
LOCATION OF PRIMARY WORKPLACE			
Metropolitan	41%	54%	42%
Urban	48	52	33
Rural	65	57	38
LOCATION OF MAJORITY OF PROJECTS			
1 CA County	45%	51%	33%
Multiple CA Counties	47	55	46
Outside California	33	60	37
Outside United States	50	77	62

they are less likely to report positive changes from networking of offices.

Six other conditions are related to workplace location and also point, consistently, to a perception of reduced practice opportunities among rural practitioners. On two of these conditions—opportunities in international practice and entry-level opportunities—there is more than a three-fold difference in reports of positive changes between rural architects and their metropolitan colleagues. Moreover, other evidence (not shown in the table) indicates that rural architects are more likely to report a negative change in entry-level opportunities than their urban counterparts.

Two of the other measures—opportunities in the high tech industry and accessibility compliance services—involve reports of positive change. Here, again, on both conditions, there is a decreased likelihood of seeing a positive effect on practice for those in rural areas when compared to metropolitan practitioners.

The second measure of Work Context is location of majority of work projects. For two of the Trends measures, there appear to be strong differences between architects with most of their work located outside the U.S. and the other architects. For increase in international practice, 85% of those with work outside the U.S. and 55% of those with work outside of California report positive changes for their practice, compared to less than 20% of those in

the two categories with the majority of their work in California. The other measure with a strong difference is shortened time frames, with those architects with the majority of their work outside the U.S. much more likely to perceive negative change than the other architects.

A third condition involving a large difference among work project location categories is networking of offices. However, on this condition, it is those with most work outside of California who are most likely to have seen positive changes to their practice.

This pattern of differences between those with projects outside the state or the country and those with most work within California continues over six other Trends measures. For entry-level opportunities, there is an increasing likelihood of seeing positive effects as work expands outward from a single county to involve locations outside the U.S.

Two of these six measures involve perceptions of negative impacts on practice—shortened time frames and exposure to liability. On both conditions, the largest difference is between those working on projects outside the U.S. and the three categories of architects with work within the U.S.

TRENDS IN PRACTICE—NEXT FIVE YEARS

Trends in Practice—Next Five Years. The concept of trends in practice in the short-term future was constructed by the measures of the respondents' expectations of changes in the profession over the next five years (1998-2003).

A question in the Trends in Practice section of the survey asked respondents to indicate the kind of change they expect to occur in the profession over the next five years in relation to six aspects of practice. The respondent could choose one of three options—"Decrease," "No Change," or "Increase." Based on statistical and content considerations in relation to the substantive significance, only the results for the Increase responses for all six trends are presented in Tables 13–15.

Shown below is the survey question relating to the kind of change expected to occur in the architect's practice over the next five years and the respondents' data for is question.

Almost three-quarters expect an increase in design-build activity (72%) and the same proportion (72%) expects an increase in the effect of technology on project delivery times. And while a majority (65%) anticipate an increase in liability exposure (12% more than

for the last five years) and almost half (44%) expect national and international competition for local work to increase, over half (54%) see an increase in opportunities for national and international work and nearly two-thirds (63%) expect an increase in partnering with other architects and offices.

In Table 13, when comparing respondents by education, almost without exception, the greater the degree of education, the higher the expectation of growth in most trends. This is notable in the areas of national and international competition and national and international opportunities. Only in the liability area is there a consistent expectation of increase across all educational categories.

Based on years of practice, the two most significant variations occur in the areas of liability and national and international opportunities, where the newest practitioners see the most substantial increases.

Question:

Indicate the kind of change you expect will occur in the profession over the next 5 years on the following:

Issues or Situations	Decrease	No Change	Increase
a. Design-Build Activity	2.3%	25.6%	72.1%
b. Effect of Technology on Project Delivery Times	8.7	20.8	70.5
c. Liability Exposure	4.2	30.6	65.2
d. National and International Competition for Local Work	2.5	54.0	43.5
e. Opportunities for National and International Work	4.5	42.0	53.6
f. Partnering with Other Architects or Architect Offices	2.3	35.1	62.6

TABLE 13

contains the results of the analysis between the six measures of Trends in Practice—Next Five Years and the two measures of Professional Background.

TRENDS IN PRACTICE—NEXT 5 YEARS BY PROFESSIONAL BACKGROUND—INCREASE

Table 13

	Design-Build	Technology/ Delivery Times	Liability Exposure	Nat'l/ Int'l Competition	Nat'l/ Int'l Opport.	Partnering
EDUCATION						
Less than 4-yr degree	67%	65%	67%	36%	43%	58%
4-year degree	74	73	61	38	46	55
Professional degree	72	70	66	41	56	68
Advanced degree	74	70	67	56	63	65
# YEARS WORKED AS CA LICENSED ARCHITECT						
0–7 years	71%	70%	69%	46%	60%	65%
8–20 years	73	70	65	42	49	61
Over 20 years	72	74	55	39	45	58

TABLE 14

contains the results of the analysis between the six measures of Trends in Practice—Next Five Years and the three measures of Work Situation.

TRENDS IN PRACTICE—NEXT 5 YEARS BY WORK SITUATION—INCREASE

Table 14

	Design-Build	Technology/ Delivery Times	Liability Exposure	Nat'l/ Int'l Competition	Nat'l/ Int'l Opport.	Partnering
PRIMARY POSITION IN FIRM						
Designer	63%	75%	61%	36%	64%	68%
Job Captain	80	77	67	47	77	69
Principal	72	70	64	40	50	64
Project Architect	71	71	67	48	55	63
# FULL-TIME EMPLOYEES						
1 Employee	67%	64%	63%	38%	46%	63%
2–10 Employees	72	75	68	39	50	61
Over 10 Employees	78	71	64	54	66	63
# CA LICENSED ARCHITECTS						
1 CA Licensed Architect	69%	66%	62%	38%	48%	65%
2–5 CA Licensed Architects	72	73	66	44	55	58
6–10 CA Licensed Architects	70	71	62	52	53	63
Over 10 CA Licensed Architects	79	77	68	53	69	66

TRENDS IN PRACTICE—NEXT 5 YEARS BY WORK CONTEXT—INCREASE

Table 15

	Design- Build	Technology/ Delivery Times	Liability Exposure	Nat'l/ Int'l Competition	Nat'l/ Int'l Opport.	Partnering
LOCATION OF PRIMARY WORKPLACE						
Metropolitan	74%	71%	65%	48%	58%	63%
Urban	67	70	67	37	48	61
Rural	74	70	64	32	43	65
LOCATION OF MAJORITY OF PROJECTS						
1 CA County	72%	70%	68%	43%	51%	62%
Multiple CA Counties	72	72	64	42	54	62
Outside California	71	74	62	62	81	81
Outside United States	77	62	54	46	69	85

TABLE 15

contains the results of the analysis between the six measures of Trends in Practice—Next Five Years and the two measures of Work Context.

In Table 14, overall, an increase in opportunities for national and international work stands out in that there is a consistent pattern of moderate differences across each of the measures of Work Situation.

Beginning with the results for primary position in firm, there are some differences between both the designer and job captain categories in comparison to principal and project architect. These results should be treated with caution due to the small number of respondents who were designers and job captains.

As for the number of full-time employees, there appears to be a growing likelihood for more national and international competition and opportunities as the firm size increases. A similar pattern of results is evident for the number of California licensed architects in the office.

In Table 15, the data show Architects practicing in metropolitan locations are most likely to expect increases both in national and international competition for local work and in

opportunities for national and international work. Conversely, architects in non-metropolitan locations are least likely to expect increases in both areas.

Strong differences also exist in expectations regarding national and international work in relation to the location of majority of work projects, where there is a large difference between those with most projects within California and those with most work outside California or the U.S. For national and international competition for local work, those architects with most projects in another state are most likely to anticipate an increase in this area. These architects are also most likely to expect an increase in national and international work opportunities, while those architects with work only in California are the least likely to expect increases in such opportunities.

Partnering with other architects also shows a significant difference between those architects with work in California in comparison to those with work outside California and the U.S. The latter being more likely to expect increases in partnering.

CONCLUSION

This report has presented the results of a special analysis of the data from the 1997 CBAE Job Analysis Survey. The original survey was designed as a task analysis with the goal of gathering and analyzing data for the development of the new test plan.

This special study has had a different objective, and one that was not anticipated when the job analysis survey was designed—namely, to use the “Biographical Information” and “Trends in Practice” data to identify patterns and trends in architectural practice and to investigate their relationship to the background and work setting of the architect.

Despite the difficulties and limitations imposed by this secondary use of the job analysis data, a clear pattern of findings was generated. While these findings cannot be taken as definitive, they are derived from data on a representative sample of practitioners. Moreover, these findings are consistent with the results of the task analysis, and the findings also are generally consistent with the expectations of subject-matter expert consultants.

The study’s findings document the ongoing changes and developments in architectural practice that have been underway over the last two or three decades. And it is clear from the study’s findings that these changes and trends are not uniform. Instead, they involve and affect different groups of practitioners in different ways.

Individual practitioners, educators, and regulators must change to keep current with the forces forever altering the architectural landscape within which we all work and live.

Potential Implications

Driven by larger socioeconomic forces of the last half century, developments in architectural practice reflect the emergence of environmental concerns, the importance of societal and community relationships, rapid high technol-

ogy advances in the development of electronic office and communication systems and architectural software applications, the continued elaboration and specialization of architectural services, the growth of national and international opportunities, and changes in the legal framework of state and societal regulations and codes.

These developments have implications for practitioners, educators, and regulators. Many questions arise from the information presented in this report.

The increases in the use of alternative methods of project delivery and the development of nontraditional special services are, in part, arising from the state’s changing and growing economy.

- As more architects practice across the state and national borders, how will educators, regulators, and practitioners be affected?
- Will practitioners recognize these trends and identify possibilities in order to position themselves to provide their clients with the services they will request?
- Will education meet the needs of students entering an ever-changing profession?
- Will regulators be able to stay ahead of the curve (or even keep up) so that they can still protect the public through regulation while not hindering the marketplace?

Advances in technology and in the speed of information exchange are affecting everyone. However, the architectural profession is experiencing turmoil due to the impact of computers, CADD systems, telecommunications, and other technological innovations. The

degree to which impacts of technology are magnified by the settings in California is significant.

- What professional relationships are created by the sharing of electronic media and will laws protecting ownership rights stay current with this practice?
- Will practitioners be able to keep up with new emerging markets and compete with other (some regulated) segments of the design and construction industry?
- Will educational institutions be able to balance the teaching of modern architectural skills with the knowledges necessary to practice?
- Will regulators be able to make the changes necessary to set licensure requirements and regulatory standards consistent with these new technologies?

By the year 2001, 46 jurisdictions will require completion of IDP as a condition for licensure. California currently does not.

By the year 2001, 13 jurisdictions will require continuing education as a condition for license renewal with more jurisdictions considering it. California currently does not.

As more jurisdictions adopt IDP and continuing education requirements, various institutions must be prepared to deal with the implications of such changes.

- Will the profession provide the mentoring services necessary to ensure that qualified architects continue to enter the profession?
- Will educators become an integral part of the internship process, as is being recommended in some quarters?
- Will regulators be able to balance the need to set requirements sufficient to protect the public yet not create an unjustified barrier to entry into the profession?
- Will the profession embrace and support mandatory continuing education and use it to enhance their practice?
- Will education play an expanded role in providing continuing education to professionals?

- Will regulators be able to create meaningful continuing education requirements that result in the maintenance of minimum competency, if not improvement, in performance?

Regulators, educators, and practitioners must be cognizant of the significant changes that the profession of architecture has gone through and be prepared for the significant changes underway.

In reference to the historical aspect, according to an interview with David Gensler published in the book *The Executive Architect*, the practice of architecture has gone through the following changes:

- In the mid-1960's, the process was schematic design, design development, and construction documents.
- In the mid-'70's, the process was programming, schematic design, design development, and construction documents.
- In the late '70's and throughout the '80's, the profession developed a discipline called "strategic facilities planning," in which people with different skills performed a process that precedes programming.
- Now architectural practitioners are working on the idea of servicing the client throughout their entire organization life cycle.
- Now the strong indicator is the importance placed on service and client relationships, which is a positive sign for the profession, based on the fact that all sectors of successful businesses are moving in that direction. As the sophistication and the need for satisfaction of clients and users change, so must service-related businesses.

Attachment 1

BIOGRAPHICAL AND TRENDS IN PRACTICE INFORMATION

Biographical Information

1) Over the last five years, how many **hours per week**, on average, do you work in the profession of architecture?

(If you have been licensed less than five years, use the period that you have been licensed.) average 42.3 hours

2) Choose the category that best describes the number of full-time employees in your practice. (Include all staff members.)

1 employee (sole practitioner) 32.2%
 2–10 employees 35.1%
 11–25 employees 13.2%
 26–50 employees 6.8%
 more than 50 employees 12.8%

3) Which of the following best describes your primary work setting?

Architectural office 78.5%
 Other 9.9%
 Corporate setting 3.9%
 Remaining choices—county agency, educational institution, federal agency (nonmilitary), military, municipal agency, state agency 0.8–1.8% each

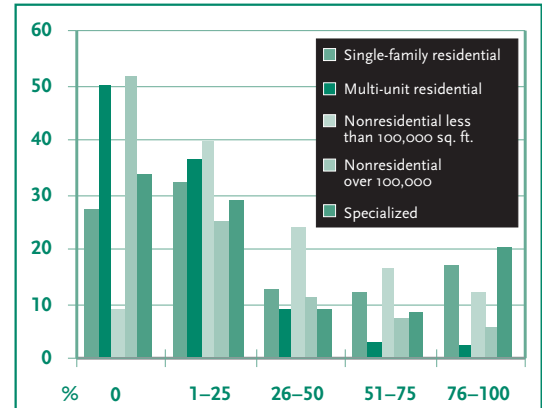
4) Which of the following best describes the location of your primary workplace (office)?

Metropolitan (more than 100,000 people) 64.2%
 Urban (20,000–100,000 people) 28.0%
 Rural (fewer than 20,000 people) 7.8%

5) Where did you complete your formal education?

In California 61.0%
 In the U.S. (outside of California) 35.4%
 Outside the U.S. 8.2%

6) Choose the category that best describes the percentage of your work that deals with each type of structure. (Given the range of the percentage categories, your responses may not equal 100%.)



7) What is the highest level of formal education that you have completed?

High school diploma 3.7%
 Two-year community college degree in field unrelated to architecture 0.4%
 Two-year community college degree in architecture-related field 4.0%
 Four-year degree in field unrelated to architecture 1.2%
 Four-year degree in architecture-related field 4.2%
 Four-year degree in architecture 17.6%
 Nonaccredited professional degree in architecture 2.1%
 Accredited professional degree in architecture 35.3%
 Advanced degree in architecture (Master's or Ph.D) 22.5%
 Advanced degree other than architecture 3.3%
 Other formal education 5.7%

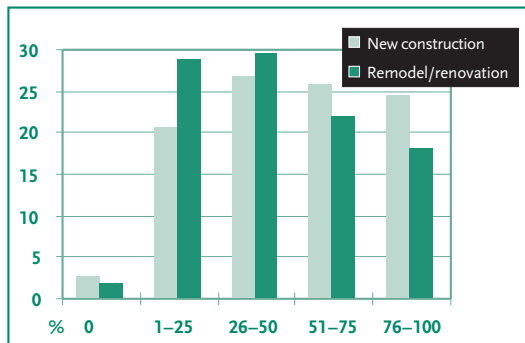
8) Choose the category that best describes the percentage of your work that deals with each type of construction.

New construction

0% 2.5%
 1–25% 20.1%
 26–50% 26.3%
 51–75% 26.4%
 76–100% 24.6%

Remodel/renovation

0%	2.1%
1–25%	29.7%
26–50%	29.4%
51–75%	20.6%
76–100%	18.2%



9) Where are the majority of your projects located? Select only one response.

One California county *	49.4%
Multiple California counties	45.1%
Outside of California	4.3%
Outside of the United States	1.3%

* (Listed below are the most frequently selected counties.)

Los Angeles	25.6%
San Diego	9.7%
San Francisco	7.0%
Orange	5.6%
Santa Clara	5.8%
Alameda	4.4%
Riverside	3.2%
Sacramento	3.4%
Sonoma	2.8%
Monterey	2.4%
San Mateo	2.6%
Fresno	2.6%
Santa Barbara	2.6%
Marin	2.0%

10) What other certifications, state licenses, or registrations do you hold?

None	57.6%
Architect (state other than California) ...	23.9%
Contractor	9.2%
Other	8.8%
Civil Engineer (PE)	2.1%

Remaining choices—attorney, building official, construction management, facilities manager, interior designer, landscape architect, professional land surveyor, real estate broker, structural engineer 0–1.3% each

11) With respect to your architectural work experience, how many years have you:

worked as a *licensed architect* in California? average 11.8 years
 worked in the profession of architecture in California (excluding time worked during schooling)? average 17.5 years
 conducted your work primarily in another state or country? average 2.5 years

12) Please fill in the bubble indicating your gender. (optional)

	Female	Male
Total survey respondents	17%	83%
Licensed 7 years or less	26%	74%
Licensed between 8–20 years	12%	88%
Licensed 21 years or more	4%	96%

13) Please fill in the bubble that best describes your ethnic background. (optional)

African American	0.8%
Asian	9.3%
Caucasian	79.4%
Filipino	1.5%
Hispanic	3.9%
Native American	1.1%
Pacific Islander	0.0%
Other	4.0%

14) At the office location where you perform the majority of your work, how many employees (including yourself) are:

<i>Licensed architects</i>	
1	40.8%
2	12.9%
3–5	19.8%
6–10	10.6%
11–20	7.9%
21–50	5.9%
51–150	1.8%

15) What is your primary position in your firm?

Designer	3.0%
Job captain	3.0%
Principal	46.8%
Project architect/manager	36.8%
Other	10.3%

Trends in Practice Information

1) Indicate your use of the following computer technologies:

CADD drafting

Do not have knowledge of this technology	8.7%
Have knowledge of the capability but do not use it	29.4%
Have the capability but use it infrequently	16.6%
Use it on a frequent basis	45.3%

CADD design & drafting

Do not have knowledge of this technology	11.4%
Have knowledge of the capability but do not use it	30.9%
Have the capability but use it infrequently	21.9%
Use it on a frequent basis	35.8%

3D computer modeling and animation

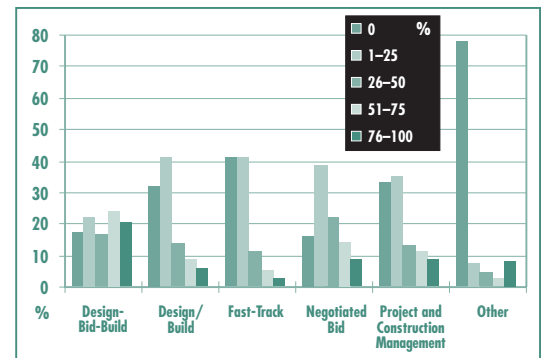
Do not have knowledge of this technology	33.6%
Have knowledge of the capability but do not use it	40.3%
Have the capability but use it infrequently	19.2%
Use it on a frequent basis	6.8%

2) For what purposes do you use the Internet?

Mark all that apply:

Do not use the Internet	35.2%
Employment opportunities/personnel resources	17.0%
Marketing	14.2%
Professional communication including exchange of documents	47.9%
Technical information/continuing education	43.4%
Other	9.5%

3) Indicate the category that corresponds to the approximate percentage of your office's architectural services that are currently delivered using each of the following methods of project delivery. (Given the range of the percentage categories, your responses may not equal 100%.)



4) With respect to continuing education, do you believe:
participation enhances your skills as an architect?

YES	85.9%
NO	14.1%

participation improves the public's perception of architects' competence?

YES	59.4%
NO	40.6%

participation should be required as a condition for license renewal?

YES	31.6%
NO	68.4%

5) Indicate the kind of change you expect will occur in the profession over the next 5 years on the following:

Design-build activity

Decrease	2.3%
No change	25.6%
Increase	72.1%

Effect of technology on project delivery times

Decrease	8.7%
No change	20.8%
Increase	70.5%

Liability exposure

Decrease	4.2%
No change	30.6%
Increase	65.2%

National and international competition for local work

Decrease	2.5%
No change	54.0%
Increase	43.5%

Opportunities for national and international work

Decrease	4.5%
No change	42.0%
Increase	53.6%

Partnering with other architects or architect offices

Decrease	2.3%
No change	35.1%
Increase	62.6%

Other

Decrease	3.3%
No change	77.6%
Increase	19.1%

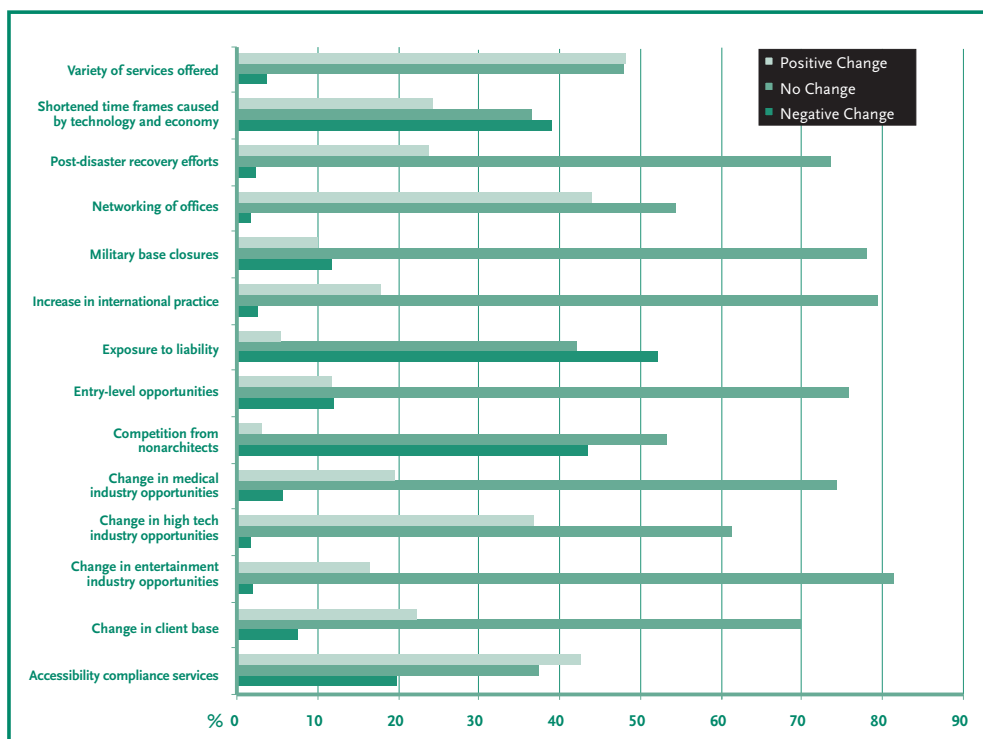
6) Select the statements below that describe your involvement with the Intern Development Program (IDP). Mark all that apply.

I am not familiar with IDP	58.3%
I completed IDP during my architect training	5.6%
There is at least one intern in my office currently participating in IDP	9.5%
I have sponsored or am willing to sponsor an intern's participation in IDP as a mentor or employer	25.1%

8) Which of the following contract forms do you use most frequently for contracting services?

AIA forms	44.9%
Client-prepared forms	8.1%
Government forms	7.5%
In-house forms	37.4%
Other	2.0%

7) Indicate the kind of effect the following have had on your practice over the last 5 years.



Attachment 2

STUDY DESIGN AND METHODOLOGIES

ACKNOWLEDGEMENT

The information contained in this report was developed from “Patterns and Trends in the Practice of Architecture in California: Results from a special study of the 1997 CBAE Job Analysis Survey data” conducted by

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STUDY DESIGN AND LIMITATIONS

The original study, the 1997 CBAE Job Analysis Survey, was designed to **enumerate** the tasks and knowledges currently used in practice by a representative sample of licensed California architects. The purpose of this survey was to gather the requisite data for updating the test plan for the CBAE Supplemental (oral) Examination. Beyond their use for verification of the sample’s representativeness, the supplemental data gathered in the “Biographical Information” and “Trends in Practice” sections of the questionnaire were intended to be used for descriptive purposes.

The study undertaken here, however, had quite a different purpose, and one that was *not* envisaged in the research design for the job analysis survey. Here the research goal was to analyze the **relations** among variables in order to identify patterns and trends of architectural practice in California, and investigate their relationship to the background and situational characteristics of practitioners. Ideally, a research study to meet this objective would be designed and conducted with a different sampling plan: one that placed less emphasis on obtaining a statistically representative sample of practitioners, and placed more emphasis on obtaining a statistically adequate sample of the groups of architects involved in the relationships to be investigated.

A second issue concerns the instrumentation. The primary development effort in designing and developing the job analysis survey questionnaire was on the construction of task and knowledge statements, and their associated scales and instructions, to ensure that these components of the instrumentation meet the measurement burden of providing a valid and reliable enumeration of current professional skills, knowledges, and abilities. The questions in the Biographical and Trends in Practice sections were accorded a lower priority in development effort and were designed, as already mentioned, to provide supplemental descriptive data. Given the priority of the task analysis and space constraints in the questionnaire, many fewer questions and also questions of lesser depth in the Biographical and Trends sections were included than would be required for a study, such as this, with its primary focus on investigating and accounting for patterns and trends in practice.

A third issue involves the measurement of trends over time—that is, the measurement of change. Ideally, scientifically adequate measurement for valid and reliable inferences of temporal patterns requires a longitudinal research design involving time series panels (measurement of standardized cross-sectional “snapshots” at a minimum of three points in time to determine the direction of change, or a “trend”) or continuous real-time measurements. However, opinions about perceptions of change can be measured in a survey when the questions involved are standardized, in terms of uniform dimensions, wording and formats, and asked under two or more different temporal conditions. The lack of such standardized instrumen-

tation for the two Trends questions means that inferences about temporal patterns in these data must be treated as suggestive, at best.

METHOD AND DATA

The sample for the 1997 Job Analysis Survey was drawn from the 16,014 valid cases on CBAE's database of licensed architects (this number excludes 4,088 "out of state" cases and 197 cases with missing or invalid data for license year). The sample plan for the survey specified a proportional random selection design, using two stratifying variables—professional experience and geographic distribution of architects—from data available on CBAE's database, to draw a sample of 3,450 survey subjects. The first stratifying variable was weighted in favor of newly-licensed architects, so that the sample frame was equally divided into two groups: newly-licensed professionals (licensed for seven years or less) and experienced professionals (licensed for more than seven years). The second stratifying variable was the geographic distribution of architects, as measured by California county residence. The stratifying objective on this variable was to obtain a random sample that was proportionally representative of licensed architects throughout California.

The two stratifying criteria were applied at the county level with the objective of randomly selecting survey subjects proportionally from the population in each county so that the sample was equally divided between newly-licensed and experienced professionals. (A small adjustment, entailing the redistribution of 336 sample units from the larger to the smaller counties, was made to boost the representation from the latter.) These procedures resulted in the selection of a sample of 3,450 subjects (21.5% of the survey population of 16,014 individuals) that was broadly representative of the geographic distribution of architects and weighted equally in terms of newly-licensed and experienced professionals.

Of the 3,450 surveys mailed to the sample, a total of 1,202 questionnaires were returned, which is a response rate of 34.8% from the sample. Of these, 175 questionnaires had to

be excluded from the study because the respondent was not currently employed as an architect. This meant that the usable sample was reduced to 1,027 respondents, which is 29.8% of the selected sample or 6.4% of the survey population.

The results of an analysis of the sample's representativeness showed that, overall, despite the low response rate, the sampling strategy appears to have functioned very effectively and has produced a close match between the characteristics of the survey population, the selected sample, and the usable sample on the two stratifying variables. The results reported are based on an analysis of the respondents in the usable sample (1,027 respondents).

LOGIC OF DATA ANALYSIS

Two steps were involved in the statistical analysis. The first step entailed an analysis of the descriptive statistics for each variable to determine if there was sufficient variability in the distribution of cases across the categories for each variable to enable statistically meaningful interactions between a given variable and another in the bi-variate analysis. Although an exhaustive picture of the architect and of current architectural practice is provided in terms of all variables in the Biographical and Trends in Practice sections, only a subset of these variables could be used for the bi-variate analysis. These variables were found to have the requisite variability (i.e., the absence of a seriously skewed distribution of cases) to warrant inclusion in the bi-variate analysis.

In the second step, we investigated the relationship between the two components of our conceptual framework, and addressed the question of the degree to which Aspects of Architectural Services Provided was associated with Characteristics of the Architect. This involved bi-variate analysis, using cross-tabulation methods, in which the aim was to determine the degree to which there was a statistical relationship between the measures of the four aspects of architectural services (Professional Services, Technology Usage, Professional Development, and Trends in

Practice) and the measures of the three dimensions of the architect's characteristics (Professional Background, Work Situation, and Work Context). At a logical level, variation in architectural services is viewed as a function of variation in the architect's characteristics. To conduct the bi-variate analysis, an exhaustive investigation of all possible pair-wise relationships between the dependent and independent variables was undertaken.

A final point concerned the manner in which the data are presented in the bi-variate tables. While the bi-variate analysis was conducted on all categories of each of the variables involved, only certain columns or rows from the complete bi-variate tables were selected and included in the tables presented in this report due to space constraints. A complete presentation of the results would have required the presentation of several hundred tables, and would have placed an enormous, unwieldy burden on the interested reader. Under these circumstances, it was judged that an abbreviated tabular presentation of the bi-variate results was appropriate.

What this means is that each of the bi-variate tables is essentially a composite table, composed of a selection of certain rows (or columns, as appropriate) representing the results for a given category of the dependent variable broken down by all categories of the independent variable. While such an abbreviated tabular presentation of the results was necessary for this report, the actual analysis was based on a full and thorough examination of the patterns of results in the original unabridged tables produced in the computer output.

A NOTE ON STATISTICAL SIGNIFICANCE

Two points should be noted when reviewing the results of the statistical analyses presented in this report. The first point concerns the question of the statistical significance of the study's results: the degree to which the results are generalizable to the larger population of licensed architects. Based, as they are, upon a large, representative sample of licensed architects in California, all results, even those

based on small case counts, are likely to be valid in that the sample is an accurate reflection of the nature and distribution of architectural practice in California. This means tests of statistical significance are not necessary because the likelihood of sample error is extremely small. However, whether the results can be generalized to other populations of architects outside California depends upon the degree to which the characteristics of architects and their practice, in these other locations, are comparable to architects and architecture in California. This is a question that is beyond the scope of this study.

The second point with respect to the issue of statistical significance concerns the question of the statistical strength of relationship between a given pair of variables. Here there are two issues. One concerns the sufficiency of case counts on variables (and categories within variables) to meet the statistical requirements to adequately analyze the nature and strength of a given relationship. As already noted, given the job analysis survey's sample design, there are insufficient cases on some variables/categories (e.g., position in firm, or work project location outside California and outside the U.S.) to enable a statistically adequate analysis of the bi-variate relationship between these variables and any others.

The second issue concerns the use of statistical tests to determine the significance of the strength of the observed relationship between any two variables. While a variety of tests of statistical association are readily available (e.g., chi-square, t-test of difference between means, lambda, etc.), these tests' significance must always be interpreted in the light of theoretical expectations. Rather than using statistical tests to determine the "significance" of relations observed between variables, it was decided to rely, instead, on a judgement of the substantive significance of the results made by subject-matter experts. In addition, the potential "significance" of observed relationships was analyzed for patterns of consistency to rule out anomalous or spurious relations produced by chance or measurement error.

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